RATIONALE

STATE OF TENNESSEE NPDES GENERAL PERMIT FOR WASTEWATER DISCHARGES ASSOCIATED WITH FILTER BACKWASH AND SEDIMENTATION BASIN WASHOUT FROM WATER TREATMENT PLANTS

Permit Number TNG640000

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1 PURPOSE AND BACKGROUND

1.1 Purpose of Rationale Sheet

This rationale or fact sheet is a document that provides the technical, regulatory and administrative basis for the Tennessee Department of Environment and Conservation, Division of Water Resources (division) permitting decision for drafting the Discharges for Filter Backwash and Sedimentation Basin washwater from Water Treatment Plants General NPDES Permit. It explains the basis for conditions of the general NPDES permit to cover discharges from water treatment plants in all areas in the state of Tennessee. This permit covers any new or existing discharges of filter backwash and/or sedimentation basin washwater from water treatment plants.

The state proposes to issue an NPDES general permit for water treatment plants as the means to authorize wastewater discharges from water treatment plants. A general permit is one designed to allow the holder thereof to conduct activities listed in Tennessee Water Quality Control Act (TWQCA) Tennessee Code Annotated Section 69-3-108 only after strict compliance with conditions and applicable effluent limitations. Section 69-3-108(a), (b) and (c) of the TWQCA explicitly states when a permit is required, and what activities shall be unlawful without a permit.

A general permit applies to a category of sources that involve the same type of wastes, and requires the same or similar permit conditions and monitoring provisions. There are two categories of water treatment plants: turbidity removal plants and iron removal plants. Within these two categories the plants processes involve the same types of operations, discharge waste, permit conditions, effluent limitations and monitoring requirements. The division acknowledges that water treatment plants meet federal and state regulations requirements to be covered under a general NPDES permit to better control the sources of pollutants and protect the waters of the state.

This proposed general permit is to be effective for a term of five years.

1.2 Number of Water Treatment Plants (WTPs) in Tennessee

The division issued the current NPDES General Permit Number TNG640000 on July 1, 2010. The general permit expires on Jun 30, 2015. There are 143 regulated WTPs that are covered by an NPDES permit to discharge wastewater to waters of the state in Tennessee.

2 AUTHORIZATION TO DISCHARGE UNDER THIS PERMIT

To obtain authorization to discharge under this permit, a facility must submit a complete notice of intent (NOI) to the division. The division may grant or deny coverage under this permit, or require an application for an individual permit. The division will review the NOI for completeness and accuracy and will specify the effective dates of the permit in transmitting permit material to the permittees.

3 PRESENT PERMIT LIMITS

Where the receiving stream is water quality limited, the general permit sets forth a calculation procedure whereby a water quality limit is applied to the discharge in accordance with the State of Tennessee Water

Quality Standards. The effluent characteristics and corresponding limits from the current general permit are listed in the table below:

Effluent Pollutant	Daily Maximum Conc. (mg/L)	Sample Type	Monitoring Frequency
Flow	Report	Instantaneous	Monthly
Total Suspended Solids (TSS)	40	Grab	Monthly
Settleable Solids	0.5 (mL/L)	Grab	Monthly
pH	6.5-9.0 (SU)	Grab	Monthly
Aluminum (total)	10 *	Grab	Monthly
Iron (total)	10 *	Grab	Monthly
Total Residual Chorine (TRC)	1 *	Grab	Weekly

*These technology-based limits are compared to water-quality based limits protective of receiving stream designated uses which are applied if and when more restrictive than the technology-based limits are needed.

4 METHODOLOGY FOR DEVELOPMENT OF EFFLUENT LIMITATIONS

4.1 Technology-Based Effluent Limitations

Federal and state laws require that a discharge permit must establish effluent limitations equivalent to the best practicable control technology currently available and the best available technology economically achievable for existing sources. Under state and federal laws and regulations discharge permits must also establish the greatest degree of effluent reduction achievable through the best available demonstrated control technology as a new source performance standard for new sources.

4.2 Narrative Effluent Limitations

A discharge permit must establish best management practices to control or abate the discharge of pollutants when numeric effluent limitations are infeasible and the practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purpose and intent of TWQCA.

4.3 Water Quality-Based Effluent Limitations

The effluent limitations, standards, or conditions of a permit must be at least as stringent as the effluent limitations, standards, or conditions in the previous permit in order to achieve water quality standards or to control all pollutants which may be discharged into waters of the state that have reasonable potential to cause or contribute to the degradation of the water body.

The division proposes water quality-based limitations for aluminum, iron and total residual chlorine to protect relatively small streams that receive the backwash or sedimentation basin washout from water treatment plants.

5 RATIONALE FOR PROPOSED EFFLUENT LIMITATIONS

5.1 Pollutant Limitations and Standard Technology

Water treatment plants (WTPs) are those facilities that treat water, ground water or surface water, and produce potable water for “domestic uses” or provide primary treatment and produce "industrial water." WTPs withdraw water from rivers, lakes, springs or creeks. WTPs also pump water from underground aquifers.

The treatment processes include coagulation, flocculation, sedimentation and filtration to remove suspended solids (SS), iron and other pollutants from the water intake. Aluminum sulfate is an agent used to destabilize the state of suspended solids in the treatment processes. Chlorine is used in the final treatment processes to disinfect the water before distribution. Iron removal plants use filtration processes (filtration media or sand) to remove iron from ground water. Iron, aluminum and chlorine used in the water treatment processes are pollutants and have reasonable potential to cause or contribute to degradation of the receiving stream.

Discussed below is the division's methodology used to determine the effluent limitations for parameters associated with regulated WTPs. Best professional judgment (BPJ) was utilized to determine the appropriate technology-based effluent limitations for the parameters: aluminum, iron and chlorine. Best conventional technology economically achievable (BCT) was used to determine effluent limitations for total suspended solids, settleable solids and pH-based limitations.

In determining technology-based limits, the division reviewed the compliance history of permitted Tennessee WTPs covered under the previous NPDES general permit. Data submitted was ovewhelmingly in compliance and did not warrant any enforcement actions by the division.

5.2 Proposed Effluent Limitations

5.2.1 Total Suspended Solids (TSS) and Settleable Solids

The State of Tennessee General Water Quality Criteria for domestic and industrial water uses, fish and aquatic uses, recreation, irrigation, livestock watering and wildlife and navigation states: there shall be no distinctly visible solids, scum, foam, oily slick, or the formation of slimes, bottoms deposits or sludge banks of such size or character as may impair the usefulness of the water as a source of domestic and industrial water supply; that may be detrimental to fish and aquatic life and as to interfere with recreation, irrigation, livestock watering and wildlife and navigation. The division proposes to retain the previous technology-based permit limit for TSS, which was based on the Tennessee Rule 0400-40-5-.03(2), “Effluent Limitations for Effluent Limited Segments” of 40 mg/L as a daily maximum concentration for TSS. The division believes this limit is achievable by WTPs and protective of designated uses of receiving streams.

Of 1,862 TSS results reported on DMRs between 2013 and 2015, the average value was 14.5 mg/L and the median value was 3.4 mg/L. Of all the data points collected, 97 percent were less than 40 mg/L.

In accordance with the Tennessee Rule 0400-40-5-.03(2) the concentration of settleable solids shall not exceed 0.5 mL/L as measured by the standard one-hour Imhoff cone test. The division proposes to retain

the previous permit limit for settleable solids of 0.5 mL/L as a maximum limit for settleable solids. The division believes this limit is achievable by WTPs and protective of designated uses of receiving streams.

Of 1,629 settleable solids results reported on DMRs between 2013 and 2015, the average value was 3.9 mL/L and the median value was 0.10 mL/L. Of all the data collected, 97% meet the 0.5 mL/L limit.

5.2.2 pH

The Tennessee Rule 0400-40-5-.03(2), "Effluent Limitations for Effluent Limited Segments," establishes technology-based limits for pH within the range of 6.0 to 9.0. According to the State of Tennessee Water Quality Standards [Chapter 0400-40-3-.03(3) (b)], the pH for the protection of fish and aquatic life shall lie within the range of 6.5 to 9.0 and shall not fluctuate more than 1.0 unit in this range over a period of 24-hours. This limit also applies to discharges into 7Q10 zero low flow streams. The water quality limit will be retained in this permit. The division believes that the water quality limit of 6.5 to 9.0 for pH is achievable by WTPs and protective of designated uses of receiving streams.

Of the 2,180 pH results reported on DMRs between 2013 and 2015, 1.3% were above the pH limit of 9.0 and 0.8% of the samples were below the previous permit pH limit of 6.5. Of all the data collected, 98% were within the permit limits range.

5.2.3 Aluminum, total

Aluminum is used in WTPs as a coagulating or a flocculating agent. A performance-based effluent limit of 10.0 mg/L was used in the previous permit as a technology-based limit and is retained in this permit. The Environmental Protection Agency (EPA) criteria document (August 1988) gives an instream criterion continuous concentration (CCC) of 0.087 mg/L and an instream criterion maximum concentration (CMC) of 0.75 mg/L with an associated pH range of 6.5 – 9.0. Based on the intermittent nature of WTP operation and discharge, the CMC-based (acute) calculated limitation for total aluminum is applicable for protection of water quality (particularly relevant to for the zero-flow receiving streams). The calculated limitation will be based on the mass-balance equation as described below.

In determining the water quality-based limits the division proposes to use the following mass balance equation assuming that the discharges of any one of the given parameters are completely mixed in the stream:

$$Cm = \frac{CsQs + CwQw}{Qs + Qw}$$

where:

Cm = the resultant in stream concentration of the pollutant
Cs = the background concentration of the pollutant in the stream
Qs = the flow of the stream, the 7-day, 10 year low flow of the stream
Cw = the concentration of the pollutant in the wastewater discharge
Qw = the flow of the discharge into the stream

If Cm is higher than the water quality standard for a parameter, then a lower, water quality-based limit (Cw) is required. The mass balance equation is used to determine Cw which is as follows:

$$Cw = \frac{Cm(Qs + Qw) - CsQs}{Qw}$$

If background concentration is assumed to be Cs = 0, then the mass balance equation would become:

$$Cw = Cm + \frac{CmQs}{Qw}$$

The division proposes to include the above procedure in order to protect designated uses of streams. Therefore, the limitation for total aluminum will be:

the lower of either 10 mg/L or $0.75 + \frac{(0.75 \times Q_S)}{Q_W}$ mg/L

as a daily maximum limit.

Qs refers to the 7-day, 10-year low flow (7Q10, or 1Q10 for regulated streams) of the stream into which backwash and washwaters are discharged. Qw refers to the discharge flow of backwash and washwater. This limit applies to wastewater discharges from plants that use an aluminum-based coagulant.

Of 1,742 aluminum results reported on DMRs between 2013 and 2015, an average value for aluminum was 0.43 mg/L and the median value was 0.25 mg/L. Of the data sampled 99.9% meet the technology-based limit of 10.0 mg/L. This analysis did not evaluate compliance with the various calculated water quality-based aluminum limits, but overall compliance was at 99%.

5.2.4 Iron, total

Based on the Tennessee Rule 0400-40-5-.03(2), "Effluent Limitations for Effluent Limited Segments", the previous general permit established a technology-based limit for iron of 10.0 mg/L. The EPA criteria document (August 1988) gives an instream criterion continuous concentration (CCC) of 1.0 mg/L. Based on the intermittent nature of WTP operation and discharge, the CMC-based calculated limitation for total iron is applicable for protection of water quality. In the absence of criterion maximum concentration (CMC), it is the division's policy to use twice the CCC value (2.0 mg/L) for establishing daily maximum water quality-based effluent limitations in NPDES permits. Therefore, using the above described procedure to protect designated uses of streams the limitation for total iron will be:

the lower of either 10 mg/L or $2.0 + \frac{(2.0 \times Q_S)}{Q_W}$ mg/L

as a daily maximum limit.

Qs refers to the 7-day, 10-year low flow (7Q10, or 1Q10 for regulated streams) of the stream into which backwash and washwaters are discharged. Qw refers to the discharge flow of backwash and washwater. This limit applies to wastewater discharges from iron removal water treatment plants.

Of 1,176 iron results on DMRs between 2013 and 2015, the average value was 4.2 mg/l and the median value was 0.11 mg/l. Of the data sampled over 98% meet the technology-based limit. This analysis did not evaluate compliance with the various calculated water quality-based iron limits, but the overall compliance was 99%.

5.2.5 Total residual chlorine (TRC)

Based on Tennessee Rule 0400-40-5-.03(2), "Effluent Limitations for Effluent Limited Segments," the previous general permit established a technology-based limit of 1.0 mg/L for TRC. This limit must be compared to the State of Tennessee Water Quality Standards for the protection of fish & aquatic life [0400-40-3.03] of 0.019 mg/L. Based on the intermittent nature of WTP operation and discharge, the CMC-based calculated limitation for TRC is applicable for protection of water quality. The CMC-based calculated limitation for TRC is 0.019 mg/L.

Therefore, using the above described procedure to protect designated uses of streams a limitation for total TRC will be:

the lower of either 1.0 mg/L or $0.019 + \frac{(0.019 \times Q_S)}{Q_W}$ mg/L

as a daily maximum limit.

Qs refers to the 7-day, 10-year low flow (7Q10, or 1Q10 for regulated streams) of the stream into which backwash and washwaters are discharged. Qw refers to the discharge flow of backwash and washwater.

Of 1,913 total residual chlorine results reported on DMRs between 2013 and 2015, the average value was 0.10 mg/L and the median value was 0.03 mg/L. 99.7 % of the data reported meet the technology-based criteria of 1.0 mg/l. This analysis did not evaluate compliance with the various calculated water quality-based TRC limits, but the overall compliance arte was over 99%.

5.3 Monitoring Requirements

Monitoring frequency for all parameters shall be once per month.

5.4 Sampling Requirements

Samples and measurements shall be representative of the volume and nature of the discharge washwater.

5.5 Reporting Requirements

Monitoring results shall be recorded monthly and reported quarterly using DMR forms supplied by the division.

5.6 Other Conditions

Permittees will be required to post a sign at the outfall that serves to notify the public of the nature of the discharge and that the discharge is regulated by the division.

Numerous standard NPDES permit conditions will be incorporated in the general permit, as required by EPA regulations. Standard requirements regard duty to comply, notification, proper operation and maintenance, signatory requirements, etc.

6 PROPOSED CHANGES IN THE NEW WTP GENERAL PERMIT

6.1 Typographical Errors and Clarifications

The proposed general permit has been modified to address typographical errors and clarifications. We do not consider any of these typographical errors and clarifications to be of a substantial nature which in any way removes, weakens, or diminishes permit requirements. Such changes are, therefore, not specifically itemized in this permit rationale. We plan to provide a "*redline*" version of the proposed permit to our customers, where all changes can be tracked and identified.

6.2 A copy of the Notice of Coverage (NOC) must be kept on site

Our inspections showed that permittee staff at some facilities had a lack of understanding of permit requirements and associated paperwork. The starting point for compliance purposes, following the submittal of Notice of Intent (NOI), is familiarity with WTP general permit coverage and corresponding requirements. Consequently, a copy of the NOC must be kept on the site.

6.3 Impaired Waters vs. Waters with Unavailable Parameters

The phrase "*impaired waters*" was not used in the most recent and applicable **Rules of the Tennessee Department of Environment and Conservation, Chapter 0400-40-03, General Water Quality Criteria** (commonly referred to as Water Quality Standards, referred to as TN Rule 0400-40-03 from hereon). The regulatory approach of using "*impaired waters*" was replaced with "*waters with unavailable parameters.*" A corresponding change was made in this proposed general permit.

The draft permit does make a reference to "*unavailable parameters.*" The phrase is used in the context of discussing proposed or existing discharges to "*waters with unavailable parameters.*" However, TN Rule 0400-40-03, does not have a definition for "*unavailable parameters*," but in the section 0400-40-03-.06 (Antidegradation Statement) states, in part:

> *"(2) Waters with unavailable parameters*
>
> *Unavailable parameters exist where water quality is at, or fails to meet, the levels specified in water quality criteria in Rule 0400-40-03-.03. In the case of a criterion that is a single response variable or is derived from measurement of multiple responsible variables, the unavailable parameters shall be the agents causing water quality to be at or failing to meet the levels specified in criteria. For example, if the biological integrity criterion (derived from multiple response variables) is violated, the unavailable parameters shall be the pollutants causing the violation, not the response variables.*
>
> > *(a) In waters with unavailable parameters, new or increased discharges that would cause measurable degradation of the parameter that is unavailable shall not be authorized. Nor will discharges be authorized in such waters if they cause additional loadings of unavailable parameters that are bioaccumulative or that have criteria below current method detection levels."*

In summary, the proposed permit is aligned with the most current and applicable TN Rule 0400-40-03 and corresponding definitions. This change in regulatory language does not have any substantive bearing on the implementation of the Antidegradation Statement or potential compliance with TMDLs within this general permit.

7 NOTIFICATION REQUIREMENTS

7.1 Notice of Intent (NOI) Requirements

Facilities who are requesting coverage under this general permit must submit an NOI to be covered under this general permit. A standard NOI form is provided in Appendix A of this general permit.

7.2 Schedule for Permit Issuance

Following are dates associated with this general permit issuance process:

Public Notice: May 26, 2015;
Target Issuance Date: July 15, 2015.

7.3 Consideration of Comments and Permit Issuance Decisions

The division will publish notice of its intent to issue the TMSP for stormwater discharges associated with industrial activity and notice the public hearing (conducted at multiple locations via videoconferencing) to receive comments on the draft permit. At least 30 day notice will be given for the public hearings. Comments will be received at least 10 ten days after the last hearing. Any interested person may request copies of the Rationale Sheet and draft permit and submit written comments on the draft permit.

Comments should be submitted to the following address:

Tennessee Department of Environment and Conservation
Division of Water Resources
Attn: Vojin Janjic
312 Rosa L. Parks Ave
William R. Snodgrass Tennessee Tower, 11th Floor
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email: *Vojin.Janjic@tn.gov*

8 PERMIT DURATION

The proposed limitations meet the requirements of Section 301(b)(2)(A), (C), (D), (E), and (F) of the CWA as amended. It is the intent of the division to organize the future issuance and expiration of this particular permit such that other permits located in the same group within the state of Tennessee will be set for issuance and expiration at the same time. In order to meet the target reissuance date for the permit and following the directives for the Watershed Management Program initiated in January 1996, the permit will be issued to expire in 2020.